

Name \_\_\_\_\_

Period \_\_\_\_\_

1. Select TRUE or FALSE for each statement.

- |                                    |            |
|------------------------------------|------------|
| a. $9^3 \cdot 9^4 = 9^{12}$        | TRUE/FALSE |
| b. $(5^2)^5 = 5^{10}$              | TRUE/FALSE |
| c. $(2 \cdot 4)^6 = 2^6 \cdot 4^6$ | TRUE/FALSE |
| d. $8^0 = 0$                       | TRUE/FALSE |
| e. $\frac{7^8}{7^4} = 7^2$         | TRUE/FALSE |
| f. $3^{-2} = \frac{1}{9}$          | TRUE/FALSE |

2. Is each expression equivalent to 16? Select YES or NO.

- |                      |     |    |
|----------------------|-----|----|
| a. $\frac{4^8}{4^6}$ | YES | NO |
| b. $16^0$            | YES | NO |
| c. $2^1 \cdot 2^3$   | YES | NO |
| d. $(2 \cdot 2)^2$   | YES | NO |
| e. $8^2$             | YES | NO |
| f. $4^{-2}$          | YES | NO |

3. Which expressions are equivalent to  $\frac{1}{8}$ ? Circle all that apply.

- a.  $2^{-3}$
- b.  $8^{-1}$
- c.  $\left(\frac{32}{4}\right)^{-1}$
- d.  $8^8 - 8^9$
- e.  $\frac{8^8}{8^9}$
- f.  $\left(\frac{1}{8}\right)^0$
- g.  $(2^3)^{-1}$

4. Luis used the properties of exponents to write two equations equal to 81. Use exponential terms from the box to complete the equations.

$$81 = \underline{\hspace{2cm}} \cdot \underline{\hspace{2cm}}$$

$$81 = \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$$

$$3^{-2}$$

$$3^1$$

$$3^3$$

$$3^4$$

$$9^{-2}$$

$$9^4$$

$$9^6$$

$$(3^2)^3$$

5. For each expression in the table, indicate with an "X" whether the value of the expression is less than 1, equal to 1, or greater than 1.

Expression	Less Than 1	Equal to 1	Greater Than 1
$(4 \cdot 7)^{-2}$			
$\left(\frac{18}{6}\right)^3$			
$(12^0)^1$			

6. Select TRUE or FALSE for each statement.

- |  |            |
|--|------------|
| a. $2 \times 10^4$ is in scientific notation.                                      | TRUE/FALSE |
| b. $0.9 \times 10^{-3}$ is in scientific notation.                                 | TRUE/FALSE |
| c. $8 \times 5^2$ is in scientific notation.                                       | TRUE/FALSE |
| d. If you write 70,000 in scientific notation, the coefficient will be 70.         | TRUE/FALSE |
| e. If you write 0.0003 in scientific notation, the second factor will be $10^{-3}$ | TRUE/FALSE |

7. Circle numbers that show how to rewrite the number in scientific notation.

$$0.0100 = \begin{array}{|c|} \hline 0.1 \\ \hline 1 \\ \hline 10 \\ \hline 100 \\ \hline \end{array} \times \begin{array}{|c|} \hline 10^{-4} \\ \hline 10^{-3} \\ \hline 10^{-2} \\ \hline 10^{-1} \\ \hline \end{array}$$

8. Use numbers from the box to write each number in scientific notation.

$$2 \times 10^{\quad} = 0.02000$$

$$40,000 = \quad \times 10^{\quad}$$

$$\quad \times 10^{-6} = 0.000004$$

$$0.0002 = \quad \times 10^{\quad}$$

-4

-2

2

4

9. The mass of a certain grain of rice is about  $3 \times 10^{-2}$  grams. The mass of a certain grain of salt is about  $6 \times 10^{-5}$  grams.
- Which has a greater mass, the grain of rice or the grain of salt? Explain your answer.
  - How many times greater is the mass of the larger grain than the smaller grain? Explain how you found your answer.

10. Light travels at a speed of  $1.86 \times 10^5$  miles per second. The Earth has a circumference of  $2.4901 \times 10^4$  miles. If an object could travel at the speed of light, how long would it take to circle Earth? Write your answer to the nearest hundredth second. Show your work.
11. A grain of sand weighs about  $1 \times 10^{-6}$  gram. Researchers at the University of Hawaii estimate there are  $7.5 \times 10^{18}$  grains of sand on all the beaches of the Earth. How much do all of those grains of sand weigh? Show your work.
12. In 2012, the population of China was about  $1.351 \times 10^9$ , and the population of Japan was about  $1.276 \times 10^8$ . Based upon these estimates, approximately how many more people lived in China than in Japan in 2012? Show your work and write your answer in scientific notation.
13. Light travels at a speed of  $1.86 \times 10^5$  miles per second. The Earth has a circumference of  $2.4901 \times 10^4$  miles. If an object could travel at the speed of light, how long would it take to circle Earth? Write your answer to the nearest hundredth second. Show your work.